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# Investigation on the Semiconducting Properties of $\text{NiO} \cdot \text{Cr}_2\text{O}_3$ Solid Solution

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Semiconducting properties of  $\text{NiO} \cdot \text{Cr}_2\text{O}_3$  and its solid solution were studied. The samples were prepared by solid state reaction of an intimate mixture of purified  $\text{NiO}$  and  $\text{Cr}_2\text{O}_3$  powders used as starting material. Chemical analysis, microscopic observation, X-ray analysis and measurement of electrical conductivity and thermoelectromotive force were carried out for these samples.

$\text{NiO} \cdot \text{Cr}_2\text{O}_3$  was found to dissolve nearly 12 mol % of  $\text{NiO}$  at  $1300^\circ\text{C}$ . Mechanism of the dissolutions was seemed to be explained by formation of vacancies in 16 d site up to 6 mol %  $\text{NiO}$ , and by the replacement of Cr ion with Ni ion from 6 to 12 mol % of  $\text{NiO}$ .

$\text{Cr}_2\text{O}_3$  doesn't dissolve into  $\text{NiO} \cdot \text{Cr}_2\text{O}_3$  appreciably up  $1300^\circ\text{C}$ , but the solubility reaches to nearly 3 mol % at  $1800^\circ\text{C}$ .

Electrical conductivity of the solid solution increases as the content of dissolved  $\text{NiO}$  increases and this solid solution is a P-type semiconductor.

Jahn-Teller distortion of the solid solution decreases as the content of dissolved  $\text{NiO}$  increases and tetragonality approaches toward 1.

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